PAO This is Apollo Control Houston at 103 hours 59 minutes into the flight and Mike Collins has given the crew a standby for their midcourse. 20 seconds to ignition for a burn that - in which the nose will be pointed at a 90 degree angle away, 90 degrees away from a radius vector running out from the center of the Earth. And we will try to describe the position of the spacecraft a bit more at the change of shift briefing. It's just a very difficult thing to visualize with the cerebral bodies. Present weight is 31 678 pounds, we're 167 548 miles from home. By the way, that quad A's temperature we reported earlier up to 86 is now down to 82. Pitch attitude is 334 degrees, his yaw 1.1 degrees, he's got .7 degrees in roll. Apparently, he's all set up now and got the angles he wants. Jim Lovell now is reporting that the burn went off on time and the duration of the burn was 14 seconds and we're trying to check now and find out exactly how many feet per second we got. Mike Collins is now filling in his post-burn report. Let's pick up this - go back from the start of the burn and pick up the conversation up til now.

CAPCOM Apollo 8, Houston. Over.

SC Go ahead, Houston, Apollo 8.

CAPCOM Frank, we've got about 2 and 1/2 minutes to ignition and why don't you chart some of your SPS switches. Not set up as per checklist specifically, rate low, deadband minimum and your BMAG mode at attitude one rate too.

SC Can't make it.

CAPCOM Can you manualize these switches in rate command?

SC Right.

CAPCOM Apollo 8, Houston. Mark 1 minuce to ignition. Over.

SC Roger. We concur.

CAPCOM Apollo 8, Houston. Mark 20 seconds to ignition.

SC Roger.

SC Houston, Apollo 8.

CAPCOM Go ahead, Jim.

SC Rog. We burned on time, 14 seconds, attitude nominal. Our residuals were plus 2 in BGX, minus 1 in BGY, nothing in BGZ. Our EMS stopped about 6.2 and still counting after the burn.

CAPCOM Rog. Understand 14 seconds, burn on time, nominal attitude, two-tenths X, one-tenth Y, and nothing minus one-tenth Y, and nothing Z, and you put 6.2 on the EMS and it continued to count after the burn. Is that affirmative?

SC No, we put the burn delta V in the EMS and after the burn, it was still counting.

CAPCOM Rog. Understand.

SC Okay, here's to be transferred the state vector to one spot.

CAPCOM Roger, Jim, thank you, and I still don't understand you on this EMS. Count it down from 5 to 0 normally and then continued through zero in a negative way and now it's reading minus 6.2. Is that affirmative?

SC Rog. That's right, it was counting up when we shut it off. Last time I saw it, it was 6.9. Now Frank just put it on AUTO again with the delta V function switch in delta V and it jumped six-tenths. Then he tried the second time and it stayed at zero so we really don't know what the story is.

CAPCOM Rog. Understand now.

PAO And that brings us up to live - up to the present. 104 hours 5 minutes. 10 minutes from now should start our television acquisition. Let's go back now.

SC I guess you want us to resume PTC - right?

CAPCOM Stand by.

PAO Reminder to the Press, in building 1 auditorium area, the big ediphor will be available for the television pass.

SC Go ahead.

CAPCOM We'd like you to resume the PTC attitude pitch 010 yaw 045 and then come out of it again for your P23 that you're scheduled in about another hour and 10 minutes. In another hour and 10 minutes.

SC Roger.

SC Mike, this is Frank. Is this TV still scheduled for 1:04?

CAPCOM That's affirmative, Frank, if you can manage it.

SC Okay.

CAPCOM How's it going with the TV, Frank? Are we - can the network count on having it on schedule? Over.

SC Yeah, we can have it on schedule. We don't have much to do but we'll perform for you.

CAPCOM Okay, we have a bunch of filter experts standing by if you need any of that.

SC Well, we're going to have to just do it inside today because there are no good shots of the Moon in the afternoon.

SC I think it's raining out there.

CAPCOM Yeah, we figured that.

APOLLO 8 MISSION COMMENTARY, 12/25/68, GET1035900,CST 2:50PM,322/3

PAO Well, till we get acquisition or until we get closer to the time, 6 or 7 minutes away, we just get off the line right now and come back up then. Our present distance 167,187, velocity in relation to the earth 4304 feet per second. Our weight is now 31,679 pounds. At 104 hours and 9 minutes into the flight, this is Apollo Control, Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/25/68, GET10414,CST 3:05PM,323/1

PAO This is Apollo Control, Houston 104 hours 14 minutes. We do not have a picture as yet. We are not particularly trying hard but we do expect it within 45 seconds. Earlier Frank Borman said only that he would have to keep the camera inside today and made some offhanded reference to the fact that it is raining outside. The Flight Plans shows two crew members, Jim Lovell and Bill Anders would be in a eating period, eating their Christmas dinner. Perhaps we'll see them performing that little chore and also Frank Borman is to be having Christmas dinner. Immediately after dinner, Frank will, like so many other people after their Christmas dinners down here on earth, will take a long nap. Frank's should extend for about 7 hours. We are hearing noise from our Goldstone station. They are having a little trouble acquiring the spacecraft today, a momentary delay we hope. 104 hours and 15 minutes in elapsed time. It's all quiet. We haven't heard from the spacecraft in about 4 or 5 minutes. Our EECOM, the communications officer here on the console advises we are not yet locked up on the high gain antenna and we certainly will have to do that in order to receive the television signal. In relation to the earth, the spacecraft is directly above the heart of South America. Over 60 degrees west longitude and about 5 degrees south latitude. Flight Director advises it will be several more minutes before we get the high gain antenna locked up. We have some small amount of tape backed up at this point. Suppose we move that now. This was recorded about 5 to 7 minutes ago. Could we have that tape please.

SC Houston, Apollo 8.

CAPCOM Apollo 8, Houston, go ahead.

SC ROGER, on this EMS, when I put in Delta V, it was reading zero, then I switched to AUTO. Sometimes it will count to 19 to 20 feet per second. I guess that is what happened.

CAPCOM Roger, understand when you put it to AUTO, it maybe will keep counting up to as much as 19 to 20 feet per second.

SC Just when you put it to AUTO, it will start counting on some occasions, by itself.

CAPCOM I understand.

PAO And that concludes our recorded conversation. We are back now to live waiting.

END OF TAPE

PAO Present velocity is, our present distance from Earth is 166 743 miles, moving at a velocity of 4311 feet per second. It's a constantly increasing value. Present weight of the spacecraft is 31 679 pounds. We're standing by waiting for the high gain antenna to lock up with our Goldstone antenna. And hopefully the antenna has a big antenna in Madrid as well. And our Communications Officer advises the spacecraft is about 3 degrees from establishing lock, and we ought to get a picture just any second now. For the newsmen who may be monitoring a picture of the Control Center, perhaps they can observe the Christmas tree down in front of the consoles between what we call the front trench and the wall displays. Now Borman says Mike, we're ready when you are, and we're certainly ready.

SC Say again.

CAPCOM Yeah, we're ready, Frank. We're all squared away and eagerly standing by. You got your make-up on?

SC Yeah, have we got a picture?

CAPCOM Negative, Frank.

SC How about now, Houston.

CAPCOM Negative, Frank.

SC We don't seem to have much luck today, but don't call for a repairman yet. It may be our camera here.

PAO We're understanding that the onboard camera takes a minute and a half, two minutes to warm up. At least that's the word of the Communications Officer, here we go back now.

CAPCOM It hasn't warmed up properly.

SC Okay, we had it on for awhile. Are you getting our FM okay?

CAPCOM Okay, Frank, there we got it. It's coming in loud and clear. We look like we're looking at your hat and now the MDC.

SC Okay, well, good-afternoon. This is the Apollo 8 crew. And how does it look now, Houston.

CAPCOM It's looking good. If you can hold the thing still, it's sort of a time delay. Any motion at all ruins our picture.

SC Tell me if there is any difference in it now.

CAPCOM It's looking good now.

SC Okay, fine.

CAPCOM It looks like your okay, but somebody else is upside down.

SC Okay, that's right, that's Jim Lovell. What we thought we'd do today was just show you a little bit about life inside Apollo 8. We've shown you the scenes of the Moon, the scenes of the Earth, and we thought we'd invite you

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APOLLO 8 MISSION COMMENTARY, 12/25/68, GET 1041900, CST 3:10 324/2

into our home. It's been our home at least for 4 days as you can see on the instrument panel. We mark off each day on the instrument panel. We're four down, and we're working on the fifth day. Of course we're all looking forward to the landing on Friday. Down here in the part of the spacecraft we call the Lower Equipment Bay, we have the President's adviser on physical fitness, Captain Jim Lovell. About to undergo an exercise program that we do everyday. You notice that he floats around very freely. He just bumped his head on the optics, used for our navigating. He's working with an exercise device that's designed to keep the muscles in shape. Now another very important function of our spacecraft is the computer and I thought you might be interested in seeing what we have here, the displays that gives us all the information about our burn, about navigating, and about the velocity that we use during entry and retrofire on Earth orbital missions. It's controlled by a DSKY, or similar to a typewriter keyboard. And the things that go in and out of that are absolutely miraculous. It's done a fantastic job for us, and Jim Lovell has done an excellent job operating it. Now another very important thing whether you're in space or the ground is eating. And I've asked Bill Anders to show you how we eat up here in the flight. Pardon the picture while we move around here and change cameras. The food that we use is all dehydrated; it comes prepackaged in vacuum sealed bags. You notice that all Bill has to do to keep it in one place is let go of it, except for the air currents in the spacecraft it would stay perfectly still. He gets out his handy, dandy scissors and cuts the bag. The food is varied, generally pretty good. If that doesn't sound like a rousing endorsement, it isn't. But nevertheless pretty good food. You can see that Bill is very clever. He does things swiftly. Actually, those food bags are stuck together because they've been vacuumed packed.

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69/8

CAPCOM What do you have today, Bill, for dinner?

SC Well, here we have some cocoa, should be good. I'll be adding about 5 ounces of hot water to that. These are little sugar cookies, some orange juice, corn chowder, chicken and gravy, and a little napkin to wipe your hands when you're done. I'll prepare some orange juice here. Okay, you can see that he's taking the scissors and cutting the plastic end off a little nozzle that he's going to insert the water gun into. Water gun dispenses a half ounce burst of water per click. Here we go; Bill has it in now. And the water is going in. I hope that you'll have better Christmas dinners today than this, but nevertheless we thought you might

be interested in how we eat.

CAPCOM Roger, I haven't heard any complaints down here, Frank. We're going to bring up ~~the~~ speed on your food when you get back.

SC Very good.

CAPCOM Looks like a happy home you've got up there.

SC Ordinarily we let these drinks settle for 5 or 10 minutes, but Bill going to drink it right now, then, to get on with the program. He cuts open another flap, and you'll see a little tube comes out. This is not a commerical. And he drinks his delicious orange drink, maybe I should say he drinks his orange drink. He's usually not that fast. Bill is really in a hurry today. Well that's what we eat. Now another very important part of the spacecraft is the navigation station or the optics panel. And we - just a minute Bill wants to say something. That's good, but not quite as good as the old California orange juice. Bill's from Florida. Okay, now if you'll let me have the camera Jim, I'll show the people where you do most of your work. Okay. Can you explain it? If I can clean up some of Bill's food around here, and have some delay. Down in this area is called the LEB or the lower equipment bay. And we have our optics positioning equipment right here. We do all our navigation down here by siting on stars and on horizons of either the Moon or the Earth. And this is where we find out exactly where we are in space, what direction, and how fast we are traveling. And our computer, as Frank has mentioned it, takes information and tells us how to maneuver to get home safely. I work with the scanning telescope and the sextant and occasionally if I get too busy, I just sort of float out of site and go up into the tunnel which is the tunnel to the hatch of the lunar module which we don't have onboard, of course. Now, that's about all we have for today. I - each and everyone of us wish each and everyone you a very Merry Christmas. And, I guess we'll see you tomorrow, and we'll be landing early Friday.

PAO And at - this is Apollo Control. We started receiving pictures at 104 hours 24 minutes. And we saw the wind up at 104 hours 33 minutes 55 seconds. This is Apollo Control, Houston.

END OF TAPE

CAP COM Apollo 8, Houston [illegible] 104 hours [illegible] minutes [illegible] the flight, and [illegible] the Christm[illegible] di[illegible] we have re[illegible]ed [illegible].
CAP COM Apollo 8, Houston.
SC Come in, Mike.
CAP COM We're suggesting attitude deadband max and [illegible] high.
SC You're right, thank you.
SC Houston, Apollo 8.
CAP COM [illegible] there, Frank.
SC [illegible] [illegible] [illegible] the midcourse [illegible] [illegible] trajectory [illegible]
CAP COM [illegible], the longer we track, the smaller we'll [illegible] [illegible] [illegible] [illegible] [illegible] answer.
CAP COM Apollo 8, Houston.
SC Go ahead.
CAP COM [illegible] midcourse correction for at 122 hours is zero and in about an hour and a half we'll have some [illegible] data to confirm [illegible].
SC Okay, thank you. We're going to have something to eat here, Mike, just taking it easy.
CAP COM Roger, understand.
SC ~~Get another shotgun for Christmas~~ Did you
CAP COM No, I'm missing enough with the [illegible] I have.
SC That's what Edwin told me. [illegible] thought maybe you might want to try another one.
CAP COM Well.
SC [illegible] it [illegible] 40 shots at [illegible]
CAP COM [illegible] regardless Frank, I'm 100 per cent. One bird [illegible]
SC Then you and I are in the same fix.
SC Houston, Apollo 8.
CAP COM Apollo 8, Houston, go ahead.
SC It appears that we did a good [illegible] in the food [illegible]. Just after our TV show, Santa Claus brought us a [illegible] dinner each. It was delicious. Turkey and gravy, [illegible] [illegible] [illegible] [illegible] outstanding.
CAP COM Roger, Jim. Glad to hear it. [illegible] down [illegible] [illegible] [illegible] and [illegible].

END OF TAPE

69/1
69/2

CAP COM This is Apollo Control, Houston, 105 hours 26 minutes into the flight. A few minutes ago, Frank Borman told us that they had a number of navigational checks to make and their attitude might consequently put certain quads in the sun for an overlong time. As a result, he asked us to keep an eye on temperatures. Here's how the conversation went.

SC Houston, Apollo 8.

CAP COM Apollo 8, Houston. Apollo 8, this is Houston, over.

SC Roger. We've got an awful lot of these stars to mark on now, Mike, and they were having some concern about the PPC, will you let us know if we stay in one position too long, or if we have to knock off and do some PTC?

CAP COM Will do, Frank.

SC Thank you.

CAP COM Apollo 8, Houston. We are monitoring your temperature. The quads all look good. We will continue to do so and we expect no difficulty with them during the P23 work.

SC Thank you.

SC Our highest tank temperature now is C.

CAP COM Understand. C is ...

CAP COM And our present distance from earth is 163,838 nautical miles, velocity 4,360 feet per second, current weight 31,679 pounds. At 105 hours 28 minutes into the flight, that's our status.

END OF TAPE

PAO Apollo Control, Houston, here 106 hours 10 minutes into the flight. And here is what's been going on.

CAPCOM Apollo 8, Houston, over. Apollo 8, this is Houston, over.

SC Go ahead, Houston.

CAPCOM Roger, Bill, we would like to talk about your high gain antenna sometime when you get a minute.

SC Okay, just a second, Mike. About 5 minutes Mike, we'll be done here. Houston, Apollo 8, about the high gain antenna.

CAPCOM Okay, Bill, ... can be an extremely worthwhile thing to find out how it operates in the auto, react mode, and we propose running a test on it in that mode from 109 to 110 hours g.e.t., over.

SC Okay, we'll do that.

CAPCOM Okay, I have about a -

SC We'll try it on the way out, okay.

CAPCOM We have a detail procedure which we can read up to you anytime you're ready.

SC Go ahead.

CAPCOM Okay, we suggest to start time 109 hours g.e.t., stop time 110 hours. And you'll be in a PTC, we're requesting a left roll rate which we notice that you've been perfering. A left roll rate of 1 revolution per hour, and this is in your present PTC attitude, IE pitch to 10 degrees 010 degrees and yaw 45 degrees. The procedure is at step one. Stop at roll angle 150 degrees; acquire is a step two. Acquire in manual mode. Three switch to auto now beam. Four, make sure tracking auto mode then switch to auto react mode. Five. position the high gain antenna -

SC Whoa, whoa, whoa.

CAPCOM Okay, whoa, whoa, standing by.

SC I'm still starting. Okay, make sure tracking in auto and then what?

CAPCOM Make sure tracking in auto, and then switch to auto react mode, over.

SC Okay, will do.

CAPCOM Okay, step 5, position high gain antenna pitch and yaw control to predicted Earth's rise angles. And those angles are yaw 50 degrees, pitch minus 40 degrees,over.

SC Okay.

CAPCOM Okay, two more upsteps. Step 6, remain on high gain antenna in this mode for 2 revs. Do not switch to OMNI anytime during these 2 revs, and maintain mode configuration of voice and data. We expect loss of track should be no more than 15 minutes per rev, over.

SC Roger.
CAPCOM And the final step 7, is any problem arises go back to your initial gimbal angles of 10 degrees pitch 45 degrees yaw, and 150 degrees roll. Reacquire and go to auto mode, over.
SC Yes, I guess, there ought to be a 10 4A which says start roll again, right.
CAPCOM That's affirmative. Excuse me there, that's affirmative.
SC Okay, if - let's see if we - I don't understand your last comment. If we get into a problem, you want us to go back to 150 degrees roll.
CAPCOM Well, all we want you to do is go ahead and reacquire in the auto mode, Bill. And it looks like that would be one way of doing it, but all we're saying is the, you know, if you want to talk to us about something or you have any other problems or you don't like the way it looks, anything at all, just go ahead and reacquire in the auto mode.
SC Yeah, why don't we just say that if we do have problems, it doesn't pick up when it's supposed to, give it a good try and then call you up on the (garbled) we talk about it and try for another 2 revs.
CAPCOM That's just fine, Bill.
SC Okay, it's worked. We tried it once or twice on the way out, but the one modification when it did break lock and go to its' manual position with that special OMNI inbetween. That sound fine.
CAPCOM Bill, could you run through that again. We're not reading you too loud and would you say again what you tried on the way out, please.
SC On the way out, they gave us some react angles which we used and once it broke lock and repositioned itself, why it went over to the OMNI. And waited till we got to near breaking lock again and switched back and snapped right in there.
CAPCOM Roger, thank you, we copy.
SC We have a few more stars to get, and then we'll give it a try.
CAPCOM Roger.

END OF TAPE

PAO This is Apollo Control, Houston 106 hours 52 minutes into the light -- into the flight. We've had a long quiet period this afternoon. The ground -- on the ground here we are working with Jim Lovell. Checking out his computer programs and comparing them against our, sending him some programs so they can be put in and compared. All in all sort of a feeling of relaxed vigilance, I would say. No major activities going on. Frank Borman should be sleeping but he's not. He hasn't turned in yet. Before too much longer goes by we plan to play the crew a little music. Perhaps some Christmas Carols. We have some conversation backed up here we will play it for you now.

SC Houston, Apollo 8.

CAPCOM Apollo 8, Houston. Go ahead.

SC Roger, for some reason, we suddenly got a program 01 and no attitude light on our computer.

CAPCOM We confirm that. Stand by one, Jim. We're working on a procedure for getting you cranked back up again.

SC Okay.

CAPCOM Apollo 8, Houston.

SC Go ahead.

CAPCOM Okay, Jim, while we're working on this procedure, we'd like to know did you select 01, did you get above 37 ... on enter.

SC Let's see, I'm not too sure, Mike. I might have done that, yeah. We have star 01 coming up, now that might have been the reason.

CAPCOM Okay, we understand. Why don't you just hold what you've got on your DSKY, and we'll be with you shortly.

SC Okay.

CAPCOM Apollo 8, Houston.

SC Go ahead.

CAPCOM Roger, could you or Bill give us a better OMNI antenna, please.

SC Roger, stand by.

CAPCOM Apollo 8, Houston, over.

SC Go ahead, Houston, Apollo 8.

CAPCOM Okay, Frank, our procedure is to select P00 and from P00 go to P51, and get a platform alignment. After you've done that we will send you up a P27, a REFSMMAT, and then you can do P52 REFSMMAT options. Then you'll be back in business, over.

SC Okay, Mike, thank you. Roger. Houston, this is Apollo 8. Houston, Apollo 8.

CAPCOM Apollo 8, this is Houston, go ahead. Apollo 8, this is Houston, say again, over.

SC Okay, we've completed a P51 now, you want us to try a P52, or do you want us to wait till we can put a REFSMMAT in.

APOLLO 8 MISSION COMMENTARY, 12/25/68, GET 1065200, CST 5:43 328/2

CAPCOM Stand by one, will you, please, Frank.

SC Roger.

CAPCOM We're putting together a P27 load for you now, Frank. That's the reason for the delay, we just want to make sure we don't overlook anything before we send it up to you.

SC Okay, we'll just sit back then. We've got a good P51. We'll just wait till you put in a REFSMMAT and then of course we'll fine line over to that, right.

CAPCOM That's right, that's exactly right, just stand by.

SC Mike, this is Frank, again.

CAPCOM Go ahead.

SC I suggest that we go ahead while you're doing that do a P52 here, and let it do an automatic and just keep this up. Jim had to use Rigel and Sirius, and they're pretty close together. And although we got a zero difference for the star angle, that might not be a bad idea just to try a P52 here.

CAPCOM We'd rather not do that, Frank. Stand by one.

SC All right, we won't do a thing.

CAPCOM Frank, we feel that procedure that you're talking about is really not required, and it's sort of wasting your time. You'd still have to upon completion of that, we'd have to send you a new REFSMMAT, and you'd have to go ahead and do a P52 to that REFSMMAT in addition, over.

SC We understand that, go ahead. We'll wait for your REFSMMAT.

CAPCOM Okay, thank you. Apollo 8, Houston, if you'd go P00 in accept we have our P27 ready. We'll send you up a REFSMMAT, over.

SC Roger, P00 in accept.

CAPCOM Roger. Apollo 8, Houston. Frank, we'd like to make sure you understand that when you do your P52 you want to select option 1, the perfered option because those are the registers we're blinking on with this P27.

SC Roger, option 1, thank you.

CAPCOM Apollo 8, Houston. We got the load in, and it's your computer. Go to block.

SC Okay, roger, stand by.

CAPCOM And you can go ahead with your P52 at your convenience.

SC We're going ahead right now.

END OF TAPE

CAP COM Apollo Control here at 107 hours, 19 minutes into the flight. And the long quiet afternoon continues with Jim Lovell looking at his computer programs and us looking at his computer program, and essentially nothing new to report. Here's the conversation that's ensued since our last report.

CAP COM Apollo 8, Houston.

SC Go ahead, Houston. Apollo 8.

CAP COM Roger. When Jim gets to the end of P52, he's got a flashing 37, we'd like him to not proceed to hold at that point, we'd like to read some bits and pieces out of the computer at that time. Over.

SC Roger.

CAP COM Apollo 8, if Anders has got time to give us a countdown, could we get the biomed switch from center to left?

SC Do one point.

CAP COM Did you take that one point seven second time to end the count?

SC Sorry about that. Okay, Houston, you have it.

CAP COM Thank you, Jim. And I'll give you an estimate here on how long we want to hold it at this point, it won't be too much longer.

SC Roger. It was my goof, I must have put in 3701 instead of 3723 and 501.

CAP COM Roger. Apollo 8, Houston, we have got a flight plan suggestion for you.

SC Go ahead.

CAP COM Go ahead and delete the remainder of the P23's that you're working on now, go back to PTC attitude and then pick up where it says 108 hours into the flight plan to pick up again there with P23, or if you prefer to switch that time a couple of hours if you want to get some rest inbetween.

SC I think that's a good idea, we'll do that.

CAP COM Okay.

SC What does this do to our state vector?

CAP COM Not a thing, we've looked at your state vector and it's good.

SC So we didn't lose all that we had just accomplished, right?

CAP COM Stand by one on that Jim, I don't know, I'm checking.

CAP COM Apollo 8, Houston.

SC Go ahead.

CAP COM Roger. I say again, your state vector is just fine, it's still ticky-poo and the reason we're

holding here is that we're checking to see if any P23 information was lost, that's reason one, and the second reason is that your W matrix shares some computer memory cells with P01 and we are getting a clarification on the status of your W matrix before we proceed. Over.

SC Roger, Michael. We'll go ahead and start heading over to the PTC attitude.

CAP COM Very good.

SC Do you need that high gain any more, Mike?

CAP COM Negative, we don't need it any more.

CAP COM Apollo 8, Houston.

SC Go ahead.

CAP COM Roger, Frank. We're coming up on time for an oxygen purge on all three fuel cells, it might be a good time to do it while we are waiting here.

SC All right. All right, Mike, we are going to purge the three fuel cells of oxygen only.

CAP COM That's good. Thank you. That's enough on fuel cell number 1, if you'd start on 2 please.

END OF TAPE

PAO Apollo Control, Houston, here 107 hours 44 minutes into the flight. And the exhaustive business of checking the onboard computer continues. We're 157,989 miles from home moving at a velocity 4464 feet per second. Our weight is down to 31,679 pounds. Here's how the conversation has been running.

CAPCOM Apollo 8, Houston. We're in low bit rate now. Last time we saw you, you were still purging, over.

SC Roger, (garbled)

CAPCOM You're unreadable, but request that you end your purge.

SC Roger, we end the purge.

CAPCOM Thank you. Apollo 8, Houston, over.

SC Go ahead, Houston.

CAPCOM Roger, Jim. I've got a short procedure I would like to read up to you on your DSKY, and I'd like to explain what it is. Your W matrix shared some memory locations with P01, therefore the W matrix that you have right now is not a good one. And we would not want you to continue your P23 sighyings with that matrix. So the procedure I'm going to give you is going to cause the matrix to reinitialize itself prior to your next P23 when you go into P23. And this will put you back with the value of the W matrix which you loaded after TEI. You remember that 33 hundred and 3 thing. And if this has any further effects on the flight plan, we're in the process of sorting that out and if need be we'll send you up a revised sighting schedule later, both with the com and loss of com case, over.

SC Okay, stand by and I'll get something to copy with.

CAPCOM Okay.

SC Okay, go ahead.

CAPCOM Okay, and search without releasing the flashing verb 37. The following: the verb 25 down 07 enter 77 enter 40 enter enter verb 37 enter 00 enter, over.

SC Understand, we insert verb 37 without releasing, is that correct?

CAPCOM Roger, you should have flashing 37 on your DSKY now, and without releasing that flashing 37 go ahead with the verb 25, et cetera.

SC Roger, okay, I see what you mean. Okay we'll insert verb 25 down 07 enter, 77 enter 40 enter enter reinsert verb 37 enter 00 enter.

CAPCOM That's all correct. Say if you've got any questions about that, we would be happy to answer them.

SC Roger, are we cleared to do that now?

CAPCOM That affirmative, Jim.
SC Roger. Hey, Mike, this is Frank.
CAPCOM Go ahead, Frank.
SC Is there any danger that this might have screwed up anyother part of memory that would be involved with entry or anything like that?
CAPCOM Frank, all indications are that there is absolutely no problem with anything in the computer memory other than the W matrix, however, we are continuing to look at it, and if there is any doubt in our mind we will ask you to dump the memory locations for us later, over.
SC Okay, fine.

END OF TAPE

PAO This is Apollo Control, Houston at 108 hours 12 minutes into this flight. Frank Borman is now retired for a night's sleep. Jim Lovell is still going through his computer check with the ground, and Bill Anders is up and about, refers to himself as the JOD which I believe means Junior Officer of the Day. Here's some conversation.

CAPCOM Apollo 8, Houston.

SC Go ahead, Houston.

CAPCOM Roger, Jim, we thought you might be interested in knowing based on 2 and a half hours worth of track after your last midcourse and looking ahead, we're predicting the midcourse correction at 122 hours will be less than 1 foot per second. And keep it on going to entry enterphase minus 2 hours. We're predicting 2 foot per second midcourse at that time. Now those numbers will be refined. We'll get about another 8 hours of track on you before we amend them. over.

SC Sounds like we're on pretty good trajectory.

CAPCOM Can't hardly beat it.

SC After we do these next P23, I'll see what our P37 gives us. What's that midcourse 122 hours that has pratically zero?

CAPCOM Yeah, it's looking to be less than 1 foot per second about 4 tenths of a foot per second right now. And then the one before entry at 2 hours before Entry Enterphase is looking to be about 2 feet per second.

SC Roger, well, okay. I'll run a P37, and we can just compare the difference. Houston, Apollo 8, over. Houston, Apollo 8, over.

CAPCOM Apollo 8, Houston, over.

SC Roger, got the JOD back on watch again. We want to make sure we don't overdo the star sitings at the expense of thermal control, so you might keep a eye on us and give us a no-go if we start getting too hot on one side.

CAPCOM Roger, we'll do that. Has Jim gone to bed?

SC No, I'm right here. We're going to start doing assist to nav right now, and Bill's up in the left-hand seat.

CAPCOM Roger, understand, you're going to do some P23's now. We thought you were going to take a rest, and do them later.

SC No, Frank, is asleep now. We'll get these out of the way. So I'm coming over to do a trunion alignment at this time, and then we'll go into the P.

CAPCOM Okay, Jim. There's one thing before you get started on the P23. What we told you before, we still think is absolutely correct. The only thing in the computer

memory that is changed by that P02 is the W matrix. However, as an additional precaution, we'd like to dump the computer memory and go through it and check it bit by bit and make sure everything is exactly copathetical.

SC Okay, do you want to do that now?

CAPCOM Affirmative, we're getting Goldstone configured for it; it'll be just a minute. And while we're doing that I can read you this procedure, if you're ready to copy.

SC Okay, stand by one, and I'll be ready to copy pretty soon.

CAPCOM Thank you.

SC Go ahead.

CAPCOM Okay, we'd like a verb 01 noun 01 enter 333 enter and then we'd like for you to read us register 1. Register 1 we expect will be a 10 000, and if register 1 is equal to that then what that means is that the computer will dump it's eraseable memory twice. That's 10 000 numbers - twice number for the eraseable memory dump. If it's not reading 10 000, then we'll ask you to make it read 10 000 by going verb 21 noun 01 enter 333 enter 10 000 enter. After you've done that the dump verb is verb 74 enter, and that will automatically dump the total eraseable memory twice, and return you to the proper configuration.

SC Okay, the procedure will be verb 01 noun 01 enter 333 enter and read out register 1. And then 10 000 the memory - the computer will then dump the memory twice as properly configured. If not, we have to load in 10 000 and we do that by going verb 21 noun 01 enter 333 enter 10 000 enter and verb 74 enter. Now if register 1 does read 10 000, then we'll still have to the verb 74 enter, is that correct?

CAPCOM That affirmative. That 74 enter is what starts the dump, then we just, prior to that one make sure we got 10 000 erase on. And just hang loose one here on Goldstone down here, we're getting it configured.

SC Roger, you need the high gain link.

CAPCOM Negative, we won't need the high gain. Apollo 8, Houston. Goldstone is all ready and you can go ahead with that procedure Jim.

SC Roger. Okay, register 1 reads 10 000.

CAPCOM Okay, thank you.

SC And do you want verb 74 now.

CAPCOM That's fine. Apollo 8, Houston.

SC Go ahead.

CAPCOM Roger, have you done the verb 74 enter, yet.

SC No, I'm waiting for your command.

CAPCOM Okay, I'm sorry, you must have missed me. You can go ahead right now, Jim, we're all set.

SC Roger, verb 74. On it's way down.
CAPCOM Thank you.
PAO Apollo Control here. Spacecraft's a 156 460 miles from Earth, moving at a speed of 4493 feet per second. At 108 hours 19 minutes, that's our status.

END OF TAPE

about 10 lines omitted here 12/4

PAO

APOLLO 8 MISSION COMMENTARY, 12/25/68 GET 108:29:00 CST 7:24pm 332/1

~~CAP COM~~ This is Apollo Control, Houston, 108 hours, 29 minutes. The crew has asked for some music to pass away the hours on this Christmas evening. Here's how the conversation is going and here's what we are piping up.

CAP COM Apollo 8, Houston.

SC Go ahead.

CAP COM With the computer, we sort of got behind in our promise of music. Do you still want it?

SC Go ahead.

CAP COM Okay.

SC Just so Neal doesn't accompany it.

CAP COM - choir. (Music of Joy to the World and a choir singing another song)

CAP COM Must be the wrong speed.

(More singing)

SC Houston, Apollo 8.

CAP COM (Music) Apollo 8, Houston, over.

SC Roger, Mike. That's real nice but if you don't mind, hold it off until we get this tracking test done.

CAP COM (Music) Roger, Bill. We concur.

SC Sounds like it has been running at the wrong speed.

CAP COM It doesn't sound very good down here either.

SC You sound better though, Mike. You're coming through nicely, Mike, maybe you could just sing a little bit.

CAP COM Yeah, I'll get my harmonica.

CAP COM This is Apollo Control here. Apparently the music didn't sound at just the right speed to Bill Anders, or it may have somehow interrupted the other activities on board. Whatever the reason, he gave us a call and asked us to stop it with the music, so we have. At 108 hours, 34 minutes into the flight, this is Apollo Control, Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12,25,68, GET 108:54:00, CST: 6:45p 333/1

PAO Apollo Control Houston, here at 108 hours 54 minutes into the flight. Since our last report we have had no communications with the crew, very, very quiet. These hours this afternoon, as you might have assumed, might be contrasted with the last several revs, perhaps earlier than that. Maybe the last 10 or 12 hours of a long-duration mission. The crew feels - senses that it is all down hill. Which of course, it is. The only thing that is different here is, that we still have 37 hours to go before splashdown. But subjectively, it is very much like the end, the last revs of an earth orbital mission and a fairly extensive one. We are 154 900 miles from earth. Speed - velocity building to 4523 feet per second. And at 108 hours 55 minutes, that's our status. By the way, we are planning a press conference this evening - press briefing, if reporter interest warrants it. Shortly after 9 p.m. Houston time in the auditorium. This is Apollo Control Houston.

END OF TAPE

PAO Apollo Control Houston here. 109 hours 17 minutes into the flight. And we have had a little chatter with the crew, Bill Anders primarily sitting over in the driver's seat. Here is how that is going.

SC Houston, Apollo 8.

CAP COM Apollo 8, Houston. Over.

SC Roger, Mike. Tell how our temperature is looking across the service module. Are we going to be GO here for a shoot in another couple sets on this next start?

CAP COM Yes, I mind them, they look real good to me Bill. Just a second and I will check with the experts. Yes, you are just fine, Bill, on your cryo fans.

SC And SPS is okay.

CAP COM Affirmative, SPS is looking good all the time. Apollo 8. Houston.

SC Go ahead, Mike.

CAP COM Roger, Bill. Because of this W matrix thing, we would like to add some more star sightings when Jim gets through with the series that he is currently on. And I have the information routed to them when you are ready to copy.

SC Stand by. Go ahead.

CAP COM Okay, this is - we would like him to do them as I say whenever he is through this area he is on now and they are the same ones that are printed on your flight plan page 2-86.

SC Houston, Apollo 8.

CAP COM Go ahead, Jim.

SC I would like - I have got the entry checklist right now. You want to give me a little bit?

CAP COM Okay, Bill. Thank you. The first one is on page E-7.

SC Okay, Mike. Ready to go. Now I know why the fuel was low.

CAP COM No. You can't blame it on him. Page is E-7 under CM RCS preheat. Halfway down where it says up telemetry block. Are you with me?

SC I am with you.

CAP COM Okay, after telemetry block, insert RCS CM heaters circuit breakers two close.

SC Okay.

CAP COM All we are doing there is just making sure you get your heater circuit breakers closed. The next one is on page E-9.

SC Ready to copy.

CAP COM I need 9 up near the top under terminate CM RCS preheat and the middle there, after CM RCS heaters off, L&P confirm, insert RCS CM heaters circuit breakers to OPEN. Got this opening those two breakers back up.

SC Roger.

CAP COM And the last change is update page 14.

SC Okay.

CAP COM Yes, this should be in favor of the earth. Very top where it says tape recorder, record forward, are you with me?

SC Roger.

CAP COM Insert between tape recorder and record forward, insert command reset high bit rate, over.

SC Okay, we got them.

CAP COM Thank you, Bill. That's all.

SC Okay, Michael.

CAP COM How is it going? Do you want any systems OP?

SC Yes, they are hanging together. I haven't even looked at them for the last half hour. I have been over here in the sack.

CAP COM Yes, they sure are Bill. They can get you any specific numbers, what not, if interested.

SC Well, I hate to say I wasn't interested, but I don't need any specific numbers right now.

CAP COM Okay, very good. We concur. That's an outer space first.

SC On second thought, how's the evaporator outlet temp doing?

CAP COM 46 degrees, Bill.

SC Cancel that ~~aerospace~~ outer space first.

CAP COM ~~Right. How's Magellan coming~~ along?

SC I am getting a crossed eye looking into space. Hey, Mike, just as a matter of interest, I have been looking into space the last hour and a half and two tremendous storms down there. I am not sure just where they are but the vortex are huge.

CAP COM Roger. Understand.

SC That's your first space weather report at the manned weather forecast from space and I am not so sure where it's raining, but it is raining somewhere.

CAP COM Roger --

SC --point out that Magellan is not a good analogy. I would also like to point out that Magellan is not a good analogy. I don't think he made it around.

Chichester

CAP COM Very good.

SC How about Alford Chichester?

CAP COM Roger. All. I don't know how much detail you can see Jim, but your subspacecraft pointed out in the middle of the Pacific Ocean about half way between Australia and South America.

SC Roger, the next time I take a look, I'll see what I can maneuver to the moon now. We see if we can see our shadow. Seriously, has anyone been able to see the spacecraft from earth? Optically?

CAP COM We don't think so Bill. We haven't been able to confirm that they have.

SC Okay.

CAP COM You are coming right down the center line of the airways. You see the airliners going the other way, you better move over.

SC That's the first time old Lovell's been on track for a long time.

CAP COM Roger.

SC Mike. An interesting viewpoint of the NAV sightings, maneuvering with the minimum impulse controller on the way home is a lot more difficult than going out because of all the fuel we don't have now. Every little pulse really moves the spacecraft around.

CAP COM Roger Understand you have too much control.

SC Yes. Let Bruce beware.

CAP COM Apollo 8, Houston.

SC Go ahead.

CAP COM Howdy, Jim. Dick Underwood is over here getting their film processing all prepared for your film when you get back and tentatively, can you give them some idea of how much you exposed?

SC Let me -- let me introduce you to the great film man. He will tell you all about it.

CAP COM Go ahead.

SC Tell him I hope he can account for haze through the window. He - on our departure from the moon, we tried to burn up as much as what we had left over which was quite a bit and tell him I hope he can develop the high speed film taken at normal film percentage.

Could he?

CAP COM Roger. Understand you used just about everything and a lot of the high speed, you used it to normal setting

SC Roger. Got in the wrong bucket there a few of times.

CAP COM Okay.

SC We never did have a chance to do anything